

APPLICATION UNDER UNITED STATES PATENT LAWS

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Invention: BROADCAST RECEIVING APPARATUS, CONTROL METHOD THEREOF, PORTABLE INFORMATION TERMINAL, AND CONTROL METHOD THEREOF

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This is a:

- Provisional Application
- Regular Utility Application
- Continuing Application
 - The contents of the parent are incorporated by reference
- PCT National Phase Application
- Design Application
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- Plant Application
- Substitute Specification
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SPECIFICATION

TITLE OF THE INVENTION

BROADCAST RECEIVING APPARATUS, CONTROL METHOD THEREOF,
PORTABLE INFORMATION TERMINAL, AND CONTROL METHOD
THEREOF

5 CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the
benefit of priority from the prior Japanese Patent
Application No. 2002-347499, filed November 29, 2002,
the entire contents of which are incorporated herein by
10 reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a broadcast receiving
apparatus, a broadcast receiving apparatus control
method, a portable information terminal, and a portable
15 information terminal control method, and more
particularly to a system which harmonizes the function
of receiving and reproducing broadcast content with a
telephone function.

20 2. Description of the Related Art

In recent years, tremendous effort has been
directed toward developing next-generation mobile
terminals, including IMT (International Mobile
Telecommunication)-2000 system compatible mobile phones
25 and mobile satellite broadcasting compatible mobile
television set.

Recently, it has been suggested that, as one of

the next-generation mobile terminal, a portable broadcast receiving apparatus for receiving mobile satellite broadcasting or ground wave digital broadcasting beamed to mobile terminals should be 5 provided with a telephone function.

If a portable broadcast receiving apparatus is provided with a telephone function, what is important is how to deal with an incoming call in the middle of watching broadcast content. Under the present 10 conditions, sufficient practical measures have not been taken against the problem.

Jpn. Pat. Appln. KOKAI Publication No. 2002-77458 and Jpn. Pat. Appln. KOKAI Publication No. 2001-245024 each have disclosed a configuration which interrupts 15 the reproduction when there is an incoming call in the course of reproducing the content with the mobile phone and, after the call, resumes the reproduction of the content near the place where it was interrupted.

However, the former is based on the assumption 20 that a system capable of requesting content delivery at any location from the delivery station is used. The latter is based on the assumption that the content recorded on the recording medium can be reproduced at any location. Neither the former nor the latter takes 25 into account an incoming call in the middle of watching an ordinary TV broadcast.

BRIEF SUMMARY OF THE INVENTION

According to an aspect of the present invention, there is provided a broadcast receiving apparatus including content reproducing means for receiving and 5 reproducing broadcast content and talking means using a telephone line, the broadcast receiving apparatus comprising: recording means for, when there is an incoming call during the reproduction of the broadcast content, recording the received broadcast content onto 10 a recording medium on the basis of a talk request; and recording and reproducing means for not only reproducing the broadcast content recorded on the recording medium on the basis of a reproduction request but also writing the received broadcast content over 15 the area of the recording medium in which the reproduced broadcast content was recorded.

According to another aspect of the present invention, there is provided a broadcast receiving apparatus control method of controlling a broadcast 20 receiving apparatus including content reproducing means for receiving and reproducing broadcast content and talking means using a telephone line, the broadcast receiving apparatus control method comprising: a step of reproducing the broadcast content received; a step of determining whether there is an incoming call during 25 the reproduction of the broadcast content; a step of, when there is an incoming call, recording the received

broadcast content onto a recording medium on the basis of a talk request; and a step of not only reproducing the broadcast content recorded on the recording medium on the basis of a reproduction request but also writing 5 the received broadcast content over the area of the recording medium in which the reproduced broadcast content was recorded.

According to still another aspect of the present invention, there is provided a portable information 10 terminal comprising content reproducing means for receiving broadcast content and displaying an image and talking means using a telephone line, the portable information terminal further comprising: recording means, when there is an incoming call in the middle of 15 displaying an image of the broadcast content, recording the received broadcast content onto a recording medium on the basis of a talk request; and recording and reproducing means for not only reading the broadcast content recorded on the recording medium and displaying 20 an image on the basis of a reproduction request but also writing the received broadcast content over the area of the recording medium in which the broadcast content whose image was displayed was recorded.

According to still another aspect of the present 25 invention, there is provided.

A portable information terminal control method of controlling a portable information terminal comprising

content reproducing means for receiving broadcast content and displaying an image and talking means using a telephone line, the portable information terminal control method comprising: a step of displaying an image of the broadcast content received; a step of determining whether there is an incoming call in the middle of displaying an image of the broadcast content; a step of, when there is an incoming call, recording the received broadcast content onto a recording medium on the basis of a talk request; and a step of not only reading the broadcast content recorded on the recording medium and displaying an image on the basis of a reproduction request but also writing the received broadcast content over the area of the recording medium in which the broadcast content whose image was displayed was recorded.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is an outside drawing to help explain a portable television broadcast receiving apparatus, which is an embodiment of the present invention;

FIG. 2 is a block diagram to help explain in detail the signal processing system of the portable television broadcast receiving apparatus according to the embodiment;

FIG. 3 is a block diagram to help explain in detail the video/audio recorder according the embodiment;

FIG. 4 is a flowchart to help explain the operation when there is an incoming call in the course of watching a television broadcast in the embodiment; and

5 FIG. 5 is a flowchart to help explain the operation when there is an incoming call in the course of watching a television broadcast in the embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Hereinafter, referring to the accompanying drawings, an embodiment of the present invention will be explained in detail. FIG. 1 shows an outward appearance of a portable television broadcast receiving apparatus 11 to be explained in the embodiment. The broadcast receiving apparatus 11 is provided with the function of a mobile phone as a talking function using a telephone line.

In a body section 12 of the broadcast receiving apparatus 11, an antenna unit 13, a liquid-crystal display 14, an operation unit 15, a speaker unit 16, a microphone unit 17, and others are provided. The antenna unit 13 is configured to have a communication function and a television broadcast receiving function.

The operation unit 15 is composed of a power key 15a, a talk key 15b for starting to speak over the telephone, when there is an incoming call, a hold key 15c for ending the talk over the telephone, a control key group 15d for controlling various functions, a

numeric keypad 15e, and others.

FIG. 2 shows the configuration of signal processing system of the broadcast receiving apparatus 11. The broadcast receiving apparatus 11 is composed of a signal separator 18 connected to the antenna 13, a telephone unit 19, a TV receiver unit 20, a key input unit 21, an interface unit 22, and a microcomputer 23.

The telephone unit 19 has a signal processor 19a, a communication protocol processor 19b, and an application processor 19c. The TV receiver unit 20 has a video/audio processor 20a, a decoder 20b, a video/audio recorder 20c, and a display processor 20d.

The interface unit 22 is composed of the liquid-crystal display 14, operation unit 15 (in FIG. 2, only the talk key 15b and hold key 15c are shown), speaker unit 16, microphone unit 17, and others.

In such a configuration, the telephone function will be explained. An incoming call signal received by the antenna 13 is supplied from the signal separator 18 to the telephone unit 19. In the telephone unit 19a, the signal processor 19a demodulates the inputted incoming call signal and outputs the resulting signal to the microcomputer 23.

When sensing an incoming call, the microcomputer 23 outputs an incoming call notice signal to the application processor 19c. Receiving the incoming call notice signal, the application processor 19c outputs

incoming call display data via the display processor 20d to the liquid-crystal display 14. Then, the incoming notice is displayed on the screen of the liquid-crystal display 14.

5 At the same time, the application processor 19c outputs incoming call audio data to the speaker 16. The speaker 16 then produces a ringtone.

When the user operates the talk key 15b in response to the incoming call, the operation 10 information is supplied via the key input unit 21 to the microcomputer 23. Receiving the operation information, the microcomputer 23 performs control not only so that the audio signal from the calling party received by the antenna 13 may be processed at the 15 signal processor 19a, communication control protocol processor 19b, and application processor 19c and then reproduced at the speaker 16 but also so that the user's speech may be processed at the microphone 17, application processor 19c, communication protocol 20 processor 19b, signal processor 19a, and signal separator 18, and then transmitted from the antenna 13. As a result, a talk with the calling party is allowed.

When the user operates the hold key 15c, the 25 operation information is inputted via the key input unit 21 to the microcomputer 23. Receiving the operation information, the microcomputer 23 determines that the call is finished, controls the telephone unit

19 into an incoming call waiting state, and ends the process.

Next, the television broadcast receiving function will be explained. A television broadcast signal received by the antenna 13 is tuned by the signal separator 18 according to the tuning operation at the operation unit 15 and then is supplied to the TV receiver unit 20.

In the TV receiver unit 20, the inputted television broadcast signal is demodulated at the video/audio processor 20a. The decoder 20b subjects the demodulated signal to an expansion process and other processes and supplies the resulting video and audio data to the video/audio recorder 20c.

As shown in FIG. 3, the video/audio recorder 20c is composed of a buffer 20c1 and a recording medium 20c2, such as a hard disk, for recording the data held in the buffer 20c1.

When an ordinary television broadcast is reproduced, the video data and audio data inputted to the video/audio recorder 20c are outputted as they are via the buffer 10c1, that is, they are outputted without being recorded onto the recording medium 20c2.

Then, the video data outputted from the video/audio recorder 20c is displayed via the display processor 20d on the screen of the liquid-crystal display 14. The audio data outputted from the

video/audio recorder 20c is reproduced at the speaker
16. As a result, the television broadcast is
reproduced.

The following is an explanation of the operation
5 when there is an incoming call in the course of
reproducing a television broadcast. As described
above, the incoming call signal received by the antenna
13 is separated by the signal separator 18 and is
10 demodulated by the signal processor 19a of the
telephone unit 19. The demodulated signal is outputted
to the microcomputer 23.

When sensing an incoming call, the microcomputer
23 outputs an incoming call notice signal to the
application processor 19c. Receiving the incoming call
15 notice signal, the application processor 19c outputs
incoming call display data via the display processor
20d to the liquid-crystal display 14. Then, the
incoming notice is displayed on the liquid-crystal
display 14 in such a manner that the notice is
superposed on the television broadcast image.

20 At the same time, the application processor 19c
outputs incoming call audio data to the speaker 16.
The speaker 16 then produces a ringtone in such a
manner that the sound is superposed on the television
25 broadcast sound.

To respond to the incoming call, the user operates
the talk key 15b. Then, the operation information is

supplied via the key input unit 21 to the microcomputer 23. At this time, the microcomputer 23 determines that the communication mode turns on and outputs a record start signal to the video/audio recorder 20c.

5 Then, the video/audio recorder 20c operates so as to record the video data and audio data inputted to the buffer 20c1 onto the recording medium 20c2 without outputting the video and audio data to the interface unit 22.

10 Having determined that the communication mode has been turned on, the microcomputer 23 brings the telephone unit 19 into the busy state as explained in the telephone function. As a result, the reproduction of the television broadcast is interrupted and the talk 15 with the calling party is realized.

When the user operates the hold key 15c after finishing the talk, the operation information is inputted via the key input unit 21 to the microcomputer 23. Then, the microcomputer 23 determines that the 20 talk has been finished and brings the telephone unit 19 into the incoming call waiting state.

At this time, the microcomputer 23 outputs a reproduction start signal to the video/audio recorder 20c. Then, the video/audio recorder 20c reads the 25 video data and audio data recorded in the recording medium 20c2 according to the recorded time sequence and overwrites sequentially the recording area from which

the data was read with the new video data and audio data obtained from the decoder 20b. That is, time-slipped reproduction is carried out.

As a result, the reproduction of the broadcast content following the broadcast content at the time when the reproduction was interrupted is started at the time when the hold key 15c is operated after the user has finished the talk. This helps prevent the user to miss the middle part of the broadcast content because of the call.

When there is an incoming call, the user just operates the talk key 15b, with the result that the television broadcast receiving function is switched to the telephone function automatically and the video data and audio data are recorded automatically. After finishing the call, the user just operates the hold key 15c, with the result that the telephone function is switched to the television broadcast receiving function automatically and the video data and audio data are reproduced automatically. This makes it easy for the user to handle the apparatus.

FIGS. 4 and 5 are flowcharts to help explain the operations when there is an incoming call while the user is watching television. First, when control is started (step S1) in the middle of reproducing a television broadcast, the microcomputer 23 determines in step S2 whether there is an incoming call. If there

is an incoming call (YES), the microcomputer 23 determines in step S3 whether there is a talk request, that is, whether the talk key 15b has been operated.

If a talk request is made (YES), the microcomputer 23, in step S4, causes the video/audio recorder 20c to start a recording operation. At this time, the microcomputer 23 calculates the maximum recordable time X (minutes) of the video and audio data from the remaining recording capacity of the recording 10 medium 20c2.

Thereafter, in step S5, the microcomputer 23 determines whether the call was finished within the time $X - 0.5$ (minutes) obtained by subtracting a specific reference time (e.g., 0.5 minute) from the 15 maximum recordable time X (minutes), that is, whether the hold key 15c was pressed within $X - 0.5$ (minutes) since the talk was started.

If the talk is not finished (NO), the microcomputer 23, in step S6, gives a warning to the user. 20 The warning is given by, for example, displaying such a message as "the capacity is full" on the liquid-crystal display 14, causing the speaker 16 to produce a specific voice message or a warning sound, or vibrating the apparatus 11.

25 Thereafter, in step S7, the microcomputer 23 determines whether the talk was finished within the maximum recordable time X (minutes). If the talk was

5 finished within the maximum recordable time X (minutes) (YES), or if the talk was finished within the maximum recordable time $X - 0.5$ (minutes) in step S5 (YES), the microcomputer 23, in step S8, reads the video data and audio data recorded on the recording medium 20c2, according to the time sequence in which the recording was done, and reproduces them.

10 As a result, the reproduction is started from the part where the reproduction of the television broadcast content was interrupted. Also in step 8, the recording medium 20c2 is overwritten with new video data and audio data sequentially, thereby carrying out follow-up reproduction as described earlier.

15 Thereafter, the microcomputer 23, in step S9, determines whether there is an incoming call again in the middle of reproducing the television broadcast. If there is an incoming call again (YES), the microcomputer 23 determines in step S10 whether the user talks over the telephone.

20 If the user talks over the telephone (YES), the microcomputer 23 returns control to step S4. If the user does not talk over the telephone (NO), the microcomputer 23, in step S11, continues the time-slipped reproduction of the recording medium 20c2 in step S8.

25 In addition, if there is not an incoming call again in the middle of reproducing the television

broadcast in step S9 (NO), the microcomputer 23, in step S12, determines whether a request to stop the reproduction of the video data and audio data from the recording medium 20c2 has been made.

5 If a request to stop the reproduction has not been made (NO), the microcomputer 23 returns control to step S9. If a request to stop the reproduction has been made (YES), the microcomputer 23 switches to the operation of reproducing the television broadcast content now on the air.

10 If the talk was not finished within the maximum recordable time X (minutes) in step S7 (NO), the microcomputer 23, in step S14, continues recording the video and audio data exceeding the maximum recordable time X (minutes) in such a manner that the area in which the old video data and audio data are written are 15 overwritten sequentially with the exceeding video and audio data.

15 Thereafter, the microcomputer 23, in step S15, determines whether to reproduce the contents recorded on the recording medium 20c2. The determination is made by displaying, for example, the message "Although the television program is not continuous, do you want to reproduce it?" on the liquid-crystal display 14 and prompting the user to operate the key corresponding to 20 YES or NO in the operation unit 15.

25 If reproduction is requested (YES), the

microcomputer 23, in step S16, starts to reproduce the oldest video data and audio data recorded on the recording medium 20c2. In this case, too, follow-up reproduction is carried out.

5 If reproduction is not requested (NO), the microcomputer 23, in step S17, erases the contents recorded on the recording medium 20c2 and switches to the operation of reproducing the television broadcast content now on the air.

10 In the aforementioned operation, when the talk is not finished within the time $X - 0.5$ (minutes) obtained by subtracting a specific reference time (e.g., 0.5 minute) from the maximum recordable time X (minutes), a warning is given to the user. This enables the user to recognize the talk end timing that prevents the user from missing the middle part of the broadcast content, which is convenient for the user.

15 When the portable television broadcast receiving apparatus 11 has the function of accessing the Internet, the recording medium 20c2 can also serve as a recording medium for recording the data downloaded from the Internet.

20 In this case, according to the amount of data downloaded from the Internet, the maximum recordable time X (minutes) when there is an incoming call during the reproduction of the television broadcast increases or decreases. That is, if necessary, the user can

determine whether to increase the amount of data downloaded from the Internet or lengthen the maximum recordable time X (minutes). In this respect, the apparatus is convenient for the user to use.

5 In a state where the talk is finished and the follow-up reproduction of the broadcast content recorded on the recording medium 20c2 is carried out, it is possible to catch up with the current television broadcast by fast-forwarding, for example, the unnecessary parts (the scenes the user does not want to watch) and thereby decreasing the amount of data recorded on the recording medium 20c2 sequentially.

10 Furthermore, the broadcast receiving apparatus 11 can also has the function of not only recording and reproducing the data onto and from the recording medium 20c2 but also carrying out fast-forward, fast-rewind, high-speed reproduction, slow reproduction, or temporary stop according to the user's operation.

15 In addition, the received broadcast content may be recorded into or reproduced from the video/audio recorder 20c, even when the user is not talking over the telephone.

20 With the above configuration and method, when there is an incoming call in the middle of reproducing the broadcast content, the received broadcast content 25 is recorded onto the recording medium on the basis of a talk request, the broadcast content is reproduced from

the recording medium on the basis of a reproduction request, and the area of the recording medium in which the reproduced broadcast content was recorded is overwritten with the received broadcast content.

5 As a result, when the talk is finished, the reproduction of the broadcast content following the one at the time when the talk was requested is started, which helps prevent the user from missing the middle part of the broadcast content because of the talk.

10 This makes it possible to deal at a sufficiently practical level with an incoming call received during the reproduction of broadcast content.

15 While the description above refers to a particular embodiment of the present invention, it will be understood that many modifications may be made without departing from the spirit thereof. The accompanying claims are intended to cover such modifications as would fall within the true scope and spirit of the present invention. The presently disclosed embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims, rather than the foregoing description, and all changes that come within the meaning and range of equivalency 20 of the claims are therefore intended to be embraced therein.

25 As described in detail, with an embodiment of

the present invention, it is possible to provide an excellent broadcast receiving apparatus, a control method thereof, a portable information terminal, and a control method thereof which make it possible to deal 5 at a sufficiently practical level with an incoming call received during the reproduction of broadcast content.